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EFFECT OF COST CONTROL AND COST REDUCTION APPROACHES IN ORGANIZATIONAL PERFORMANCE REDUCTION IN INDIRECT MATERIAL COST

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Abstract

In the era of globalization, every company is trying its best to sustain its company's name and their product in its respective market.

The overreach goal of the project is to optimize the cost in the production system using cost reduction and cost control approaches.

In any organization, the major objective is to maximize profit, but the main constraints facing them are the rise in cost of operation. Due to this, the cost of production increases and could lead to certain cost control and cost reduction which make it complex for many organizations to operate as well-organized cost limit of knowledge.

Now a days cost of the raw material in Tyre Industry increased by 30 – 40% but product cost remains unchanged due to high competition especially in Bias Tyre category. Main reason behind Bias Tyre Category is radialization.

The rate of radialization is actually an index of the status of road development, vehicle engineering and the economy in general. Notwithstanding the problem areas, constraints and limitations, tyre companies have kept pace with the technological improvements that radialization signifies and offer state-of-the-art product (tyres) comparable to the best in the world.

However, the situation has radically changed in recent years as according to Mr. Rajiv Budhiraja, Director-General of Automotive Tyre Manufacturers' Association (ATMA). In an exclusive interaction with MOTORINDIA, he states that the percentage of CV radialization is expected to increase from 45 per cent to 60 per cent by 2026, though he maintains that tyre-makers will continue to import natural rubber as there is a paucity of high-quality raw material in the country.

Due to the radialization, optimization of tyre manufacturing cost is key to success for any organization. The study aims to critically examine and evaluate the application of cost control and cost reduction in organizational performance and to review the budget as an effective tool of cost control and cost reduction. The analysis of data collected was undertaken by applying appropriate statistical tools. Problem solving techniques is use for

analysis and conclusion. Based on the findings, it was evident that cost control and cost reduction has a positive impact on organizational performance and also the style of management has a positive impact on organizational performance.

Key Words: Cost Reduction, Cost Control, Radialization, Organization, Profit and Budget

INTRODUCTION

The business environment today is very competitive, impacting every organization large or small. An impulsive reaction under the current circumstances is just to cut all costs to the minimum level. Every aspect of an organization's cost structure must be carefully examined to eliminate unnecessary discretionary and non-value adding costs, while yet retaining its competitive position (ACCA Study Text, n.d.).

In any business organization, the goal of most organizations is to achieve maximum profit. Since management is concerned with the profitability which is one of the tools to evaluate the business performance especially in a manufacturing company, the need of increasing sale will arise and this will eventually lead to increase in production capacity and as a result lead to increase in cost. Thus, the need for cost control and cost reduction is required to achieve maximum profit in competitive market where demand is affected by the price of goods and services.

Asaolu and Nassar (2007) define cost reduction as the term used for planned and positive approach to the improvement of efficiency. It can be viewed in many ways, such as increasing productivity, and elimination of waste. Lucey (1996) refers to cost reduction as a concept which has the aim of reducing cost from a previously accepted norm or standard without reducing the effectiveness or performance of the project or services.

The process of regulating the cost of operating a business is known as cost control and is involved within acceptable limits. These limits are usually stated as standard cost or target cost limits in a formal operation plan or budget. Cost control is the process of avoiding wasteful use of valuable resources and encouraging efficiency and cost consciousness.

In competitive industry, there is need to incur reasonable cost and management has to ensure careful and efficient use of resources so as to achieve the set of standard. Cost control is the process of established a standard and maintaining the performance according to standard. Therefore, cost control and reduction are important in an organization in order to regulate and reduce unwanted expenses. The significance of cost reduction and cost control derived from its function in profit maximization. Any organization that is successful using cost reduction and cost reduction can sell its product at a lower rate than its competitors without reducing its quality.

Lockey (2002) stated that, having price competitive advantage, the company can increase its market share and become a market leader. Cost control and reduction are techniques used in making other means of competition feasible. The importance of cost reduction scheme within a company cannot be overstated especially when a company is struggling to maintain profitability. Organizations that forfeit money are required to intensify profits or become more involving need to reduce expenses in order to succeed.

The main difficulty encountered by organizations recently is the increase in the cost of operation that could lead to inevitable cost control and reduction scheme which makes it difficult for most organizations to operate at the cost efficient frontier. Every organization that wants to survive and maintain its consumers must seek to improve on its product. Therefore, in order not to exceed their budget and not to run at loss, as well as not to reduce the quality of their products, organization needs to control costs and reduce their cost to the lowest minimum.

Cost control can be defined as application of investigative procedures to detect variance of actual cost from budgeted costs. Diagnostic procedures to ascertain the cause of variance and corrective procedures to effect realignment between actual and budgeted cost.

Cost control is a procedure to see if the company is spending more or less than its budgeted amount. If yes, then to know the reason behind the increase or decrease of expenditure. Further, it works at finding a way to make the actual cost and the budgeted cost meet. Cost control management also takes care of the same area of work.

Cost control is the regulation of cost of operating a business and is concerned with keeping cost within acceptable limits. These limits will usually be specified as a standard cost or target cost limit in a formal operation plan or budget. If actual cost differ from planned cost by an excessive amount, cost control action will be necessary.

Cost reduction may be defined as the achievement of real and permanent reduction in the unit cost of goods manufactured or services rendered without impairing their suitability for the use intended or diminution in the quality of the product.

Cost reduction should therefore, not be confused with cost saving and cost control, cost saving could be a temporary affair and may be at the cost of quality. Cost reduction implies the retention of essential characteristics and quality of the product and thus it must be confined to permanent and genuine saving in the cost of manufacture, administration, distribution and saving, brought above by elimination of wasteful and inessential elements from the techniques and practices carried out in connection there with. In other word the essential characteristics are techniques and quality of the products are retained through improved methods and techniques used and there by a permanent reduction in the unit cost is achieved.

The reduction in unit cost of goods or services without impairing suitability for the use intended.

A cost reduction can be directed towards reducing expected cost level by cutting cost to below current budgeted or standard level by purchasing new equipment or changing methods of working and so on. Both budget and standards reflect cost and condition which would minimise costs.

In our company reduction of conversion cost is main objectives at business level, At functional level direct conversion cost reduction is align with main objective. Direct conversion cost comprised with power cost, fuel cost, Indirect material cost, Process scrap cost, store & spare cost, repair and maintenance cost, TTF packing cost and water charges.

As per Pareto Analysis Major contributors are Power, Fuel & Indirect material cost. Dedicated Engineering team are deployed for Power & Fuel cost. As a part of production team I have focus on Indirect material cost reduction.

Objective of Study

- Make recommendation and implement the improvement of cost control and reduction in the organisation
- Review budget as an effective tool of cost control and cost reduction.
- Evaluate the problems associated with cost control and reduction
- Identify different strategies or techniques that will help to reduce the cost to the lowest minimum
- Reduction in Direct conversion of Tyre industry
- Reduction in Indirect material cost of Tyre Industry

Literature Review

Author	Year	Paper	Conceptual or Empirical	Findings	Relationship with green project management
Mamorena Lucia Matsoso Moses Nyathi Franklin A. Nakpodia	2020	An assessment of budgeting and budgetary controls among small and medium-sized enterprises	The study reinforces the communication power of budgeting and budgetary controls as SMEs and economic agents are not only aware of corporate objectives but are equally incentivised to support the attainment of these objectives.	Research results affirm that the deployment of budgeting benefits from a positive perception of the value of budgeting and budgetary controls by key SME stakeholders. The study also finds that the perception of budgeting mirrors the level of education of SME operators, as educated respondents understand the value of implementing robust budgeting systems. Despite its focus on manufacturing SMEs, this study suggests that the manufacturing budget is the least utilised budgeting system among these organisations.	Introduce budgetary control and monitoring of all the indirect material consumption
Yogeshwar and Simple Agarwal	2019	Effect of quality circle in fastener industry in production	Research showed that management-initiated QCs have fewer members, solve more work-related QC problems, and solve their problems much faster than self-initiated QCS. However, the effect of QC initiation (management- vs. self-initiated) on problem-solving performance disappears after controlling QC size. A high attendance of QC meetings is related to lower number of projects completed and slow speed of performance in management-initiated QCS. QCs with high upper-management support (high attendance of QC meetings) solve	There is steady decrease in lot rejection along with a positive linear increase in lot acceptance when lot wise inspection is done during time span of four months. Carton wise Lot Inspection increase number of shifts increase from 2 to 3 (each of 8 hours). So a huge amount of time is saved because it is not feasible to inspect each & every fastener.	Increase height of nozzle and reduce hole size of nozzle output to optimize solvent consumption

			significantly more problems than those without.		
Varsha M. Magar Dr. Vilas B. Shinde	2014	Quality Improvement By Apply Seven Quality Control (7 QC) Tool in Process Industry	The main aim of this paper is to provide an easy introduction of 7 QC tools and to improve the quality level of manufacturing processes by applying it. QC tools are the means for Collecting data , analyzing data , identifying root causes and measuring the results. these tools are related to numerical data processing .All of these tools together can provide great process tracking and analysis that can be very helpful for quality improvements. These tools make quality improvements easier to see, implement and track.	Statististical QC is chiefly concerned in making sure that several procedures and working arrangements are in place to provide for effective and efficient statistical processes , to minimize the risk of errors or weaknesses in procedures or systems or in source material Seven QC tools are most helpful in troubleshooting issues related to quality All processes are affected by multiple factors and therefore statistical QC tools can be applied to any process. The continuous use of these tools upgrades the personnel characteristics of the people involved. It enhances their ability to think generate ideas, solve problem and do proper planning.	Introduce close container for storage of solvent at tyre building machine
Dr. Ashish Thakur	2016	A Conceptual Model of Lean Manufacturing Dimensions	In practice, the organization focuses on only few aspects of lean elements such as Cellular Manufacturing, Pull System, Production Levelling etc., for driving their manufacturing system towards the success. In reality, long term success of manufacturing system in the competitive business environment depends on	The progress in lean implementation is snail-paced and needs to be augmented. It has a further scope to develop focused lean concepts, which could be implemented in other kind of manufacturing environment like low volume, high variety and high volume and low variety. The major reasons for the low level of lean management were anxiety in changing the attitude of workers, lack of awareness, and training about the lean management concepts,	Reduced inventory carrying cost of bladder by introducing lean manufacturing concept

			elimination of dreary issue such as lack of direction, lack of planning, lack of sequencing and interdependency factors of lean elements. To overcome this dreary issue, the lean elements are implemented in sequence in-line with corresponding interdependent factors with proper plan	cost and time involved in lean implementation. Therefore, it can be concluded that the manufacturing industry needs to give more attention to implement lean management in all the key areas.	
Monika Smętkowska Beata Mrugalska	2017	Using Six Sigma DMAIC to improve the quality of the production process	After implementing the changes they should be controlled to check if they influence the production process positively and bring any profits to the company. It can be performed by creating a control plan where it should be exactly define what data, how, how often and who should control. If any non-conformance is detected, instructions regarding needed actions to undertaken, should be also included. Over time, such a plan should be updated depending on the evaluations after its implementation.	It focuses mostly on improving production processes what leads to the increase of profitability of the company. Achieving Six Sigma level requires from organizations understanding the reasons of processes variability, performing their analysis of cause and effect and the assessment of their costs. The application of DMAIC, which is one of the methods of quality improvement used in Six Sigma concept, can increase the effectiveness while adequate reacting for the appearing problems	
Nimer Abedalhameed Slihat Haitham Mamdouh Abbadi Nabil Bashir Al-Halabi	2015	The Impact of Applying Cost Management Tools in Cost Reduction in Service Companies	There are problems of costs distortion, inefficient allocation of resources, the way of managing waste and damages of raw materials, and inaccurate bases of allocating indirect costs, and difficulties in controlling normal and abnormal	There were no differences on the impact of cost management tools in cost reduction attributed to the qualification factor. The conclusion is that there is a need to adopt training programs to upgrade levels of employees at different levels of activities in service companies. Costs reduction in service	

			working times in companies	companies can be achieved through determining differences between target prices and the profit margin to put pressure on management to control avoidable and unavoidable items of raw materials and conversion costs	
Tasminur Mannan Adnan Sajid Hasan Mohammad Shakilur Rahman Amit Das	2018	An Analytical Way to Reduce Cost of a Product Through Value Engineering (Case Study: Walton)	The article is shows a proper way of applying value engineering to any product in a company. Value engineering can be done to most of the products in a company. If it is not done to any product then the product is in its optimized situation and no value engineering can be done to that product. In this case study, there are 4 alternatives. Altering the material of body stand, liner and compression baseplate, reducing the thickness of the side cabinet were the alternatives. After the value analysis and study, altering the material of the body stand is selected as the best alternative for the product	Value engineering can be done to most of the products in a company. If it is not done to any product then the product is in its optimized situation and no value engineering can be done to that product. In this case study, there are 4 alternatives. Altering the material of body stand, liner and compression baseplate, reducing the thickness of the side cabinet were the alternatives. After the value analysis and study, altering the material of the body stand is selected as the best alternative for the product.	Changes the size of EVA bags according to the weight of chemical
Senthil Chandran Robert Poklemba Jakub Sopko	2019	Organizational Innovation and Cost Reduction Analysis of Manufacturing Process	Adoption of new technology, Innovating new thing & Modification of machinery are the new ways to reduce product cost and improve bottom line of the company It will not give sudden spike in the bottom line but continuously improving machinery & adopting technology will give	Innovation is one of the most important and most complex issues organizations faced with today. Innovation is the success key for organizations. Every company should has innovation process from creation to playing, when a product enters growth step, the company must play a change in product for supplying to market, because, another companies have reached	1) Introduced 8 Segments drum for easy removal of green tyre to reduce solvent consumption 2) Reduced bottom stitcher height for increasing gap between drum and tyre to remove green tyre from drum easily

			positive result in future	the technology for producing.	
Vishal P. Kokane Amarjeet S. Dhupe Nilesh V. Sable Renuka A. Tathe Milind M. Darade	2017	Effective Of Cost Control And Cost Reduction Techniques For Building Materials	Low Cost Housing: Need For Today's World; it is observed that Construction cost in India is increasing at around 50 per cent over the average inflation levels. It have enumerated increase of up to 15 per cent all year, mainly due to cost of basic building materials such as steel, cement, bricks, timber and other inputs as well as cost of labour.	Fly ash is an industrial waste from the power stations; there rise a big problem of utilization of fly ash. Fly ash can be used for different purposes as it shows the cementing properties when mixed with water. The fly ash bricks can be manufactured easily and show sufficient strength. Cost of the fly ash brick is very low as compared to conventional clay brick. Conventional clay bricks can be replaced with the Fly ash brick	Introduced Food Graded Hexene in place of Solvent naphthalene to reduce manufacturing cost

Research Methodology

Limitation

1. This study belongs to Indian Tyre industry
2. Specific study conducted in Bias Tyre section
3. As the data contains secondary, this will be limited to the specific industry.

Population

Following are the 139 items which are used as indirect material, these are the population for Tyre industry Indirect materials.

List of Indirect Material							
Sr No	Material Code	Description	UoM	Sr No	Material Code	Description	UoM
1	121012	NO. 2 RIBBED SMOKED SHEET (RSS II LOCAL)	KG	70	BOMP9BL	16 EXB 605/9 Exel bladder for 9.00-16	EA
2	130056	EPDM Polymer, 56% Ethylene, 11.5% ENB	KG	71	BOMR7BL	17 MC 230/1 BOM bladder CATL	EA
3	130842	Chlorobutyl MV	KG	72	EB44661	EVA Pale Blue Bags, 0.05mm x 46cm x 61c	KG
4	140202	TDAE Oil	KG	73	EB44670	EVA bags, pale blue color, 0.06mm x 46cm	KG
5	140388	Naphthenic Oil (ASTM type 103)	L	74	EB87870	EVA Pink Bags, 0.05mm x 78cm x 70cm	KG
6	160114	Ultramarine Blue Colour Pigment (IRM)	KG	75	EXP_13X165X 510	EXP_13X165X510 MCR Curing Bladder	EA
7	160146	Accelerator – DPG	KG	76	170191	Rubber Solvent	EA
8	160163	Zinc Sterate Precipitated	KG	77	HMPF1P03	High stiffness PE film underlay,30mm wdt	KG
9	160224	Stearic Acid (Flake Form)	KG	78	ID0101	Identification Yarn 300den Cotton White	EA
10	160327	Accelerator – CBS	KG	79	ID0102	Identification Yarn 300den Cotton Yellow	EA
11	160514	Zinc Oxide	KG	80	ID0103	Identification Yarn 300den Cotton Green	EA
12	160533	Hard Reinforcing Clay (IRM)	KG	81	ID0104	Identification Yarn 300den Cotton Blue	EA
13	160612	Insoluble Sulphur Oil Treated 20%	KG	82	ID0105	Identification Yarn 300den Cotton Brown	EA
14	160753	Silicone Emulsion 35%	KG	83	ID0106	Identification Yarn 300den Cotton Red	EA
15	161834	Poly-tert-Butylphenoldisulfide	KG	84	ID0107	Identification Yarn 300den Cotton Pink	EA
16	163305	Anti-tack Agent OG-471 H	KG	85	KMB1301	13 " TURN UP BLADDER FOR KM92 M/C	EA
17	190092	Protection paint, blue colour -BP 20	KG	86	KMB1401	14 " TURN UP BLADDER FOR KM92 M/C	EA
18	190149	solvent based mold release agent	L	87	KMB1501	15 " TURN UP BLADDER FOR KM92 M/C	EA
19	190165	Water based inside tyre lube- BP-165	KG	88	KMB1601	16 " TURN UP BLADDER FOR KM92 M/C	EA
20	191228	Anti-tack Agent HL	KG	89	KMB1801	18 " TURN UP BLADDER FOR KM92 M/C	EA
21	193116	Water based inside tyre lubricant ML 311	KG	90	KMS1301	13 " BLADDER SLEEVE FOR KM92 M/C	EA
22	194580	Mold release agent DiamondKote W-4580CL	KG	91	KMS1401	14 " BLADDER SLEEVE FOR KM92 M/CC	EA
23	197505	Rim Lubricant	KG	92	KMS1501	\15 " BLADDER SLEEVE FOR KM92 M/C	EA
24	198262	ML-8262	KG	93	KMS1601	16 " BLADDER SLEEVE FOR KM92 M/C	EA
25	890064	DRUM STICK	KG	94	KMS1701	17 " BLADDER SLEEVE FOR KM92 M/C	EA
26	890065	TACK STICK	KG	95	KMS1801	18 " CARCASS DRUM SLEEVE FOR KM92 M/C	EA
27	930101	Nylon 66 Sewing threads, BS 120N	EA	96	KMS2001	20" CARCASS DRUM SLEEVE FOR KM92 M/C	EA
28	100162R	420D/1 X 420D/1 DIPPED AND TACKIFIED N6	KG	97	L23160	Green Cotton Liner UnTreated 160 cm	M
29	162502A	Ozone Protecting Wax PE	KG	98	L7A0133D	Nylon 66 leader liner 750 gsm 133 cm	M
30	17 EXB 237/6	17 EXB 237/6	EA	99	LTB1501	15 " TURN UP BLADDER FOR L&T M/C	EA
31	17_EXR265/4	17_EXR 265/4 MCR curing bladder	EA	100	LTB1601	16 " TURN UP BLADDER FOR L&T M/C	EA
32	17EXB236/4	17EXB236/4 MCB Curing bladder	EA	101	Material	Material Description	EUn
33	17EXB280/5	17EXB280/5	EA	102	PB04660	PE Ingredient Bags Clear 46x60 cm	KG
34	17EXR 282/4	17EXR 282/4	EA	103	PB07875	PE Ingredient Bags, 0.05mm x 78cm x 75cm	KG
35	19 EXB 210/5	19 EXB 210/5	EA	104	PF2E30	PE Film yellow embossed 0.13MM x 300 MM	KG
36	190393G	Curable Striping Ink- Green colour	EA	105	PF2E42	PE Film, yellow embossed,0.13MM x 420 MM	KG
37	190394O	Curable Striping Ink- Orange Colour	EA	106	PF2E50	PE Film, orange embossed,0.13MM x 420 MM	KG
38	190394R	Curable Striping Ink- Red Colour	EA	107	PF3E36	Green Embossed PE Film, 0.13mm x 360mm	KG
39	190394W	Curable Striping Ink- White Colour	KG	108	PF7P260	PE Film 0.075 mm x 260 cm Black	KG
40	190394Y	Curable Striping Ink- Yellow Colour	KG	109	PF9E45C	Orange embossed PE film 0.17 x 450 cm	KG
41	890066B	Tread Marking Paint Blue	KG	110	PTF473	PE tubular film ,blue colour, 0.05x73 CM	KG

42	890066E	Orange tread marking paint.	KG	111	PUS1201	12 " BLADDER SLEEVE FOR PU15 M/C	EA
43	890066G	Tread Marking Paint Green	KG	112	PUS1301	13 " BLADDER SLEEVE FOR PU15 M/C	EA
44	890066P	Tread Marking Paint Pink	KG	113	PUS1402	14" BLADDER SLEEVE FOR NEW PU15 M/C	EA
45	890066V	Tread Marking Paint Violet	KG	114	PUS1501	15 " BLADDER SLEEVE FOR OLD PU15 M/C	EA
46	890066W	Tread Marking Paint White	KG	115	PUS1502	15 " BLADDER SLEEVE FOR NEW PU15 M/C	EA
47	890066Y	Tread Marking Paint Yellow	KG	116	PUS1601	PUS1601 PUS1601 PUS1601 15 M/C	EA
48	890828A	EVA Bags 0.04 x 355 x 450 mm	KG	117	PUS1702	17 " BLADDER SLEEVE FOR NEW PU15 M/C	EA
49	BAB1501	15" BEAD APEXING BLADDER	EA	118	PUS1801	18 "SHAPING HEAD SLEEVE FOR OLD PU15 M/C	EA
50	BAB1601	16" BEAD APEXING BLADDER	EA	119	TORA3NBL	RP12/0 Injection Bladder	EA
51	BAB1701	17" BEAD APEXING BLADDER	EA	120	TORE1BL	RP13/0 OLD MOULD	EA
52	BFB1501	15" BEAD FLIPPING BLADDER	EA	121	TORE2BL	RP13/5 Compression Bladder	EA
53	BFB1501AN	15" BEAD FLIPPING BLADDER (MACHINE-2&3)	EA	122	TORE8BL	RP15/0 Torroidal Bladder	EA
54	BL270049	Bladders for 27.00-49 - Outsourced	EA	123	TORF1BL	RP15/1 Injection Bladder-Reg	EA
55	BOMA4BL	13-13.6 BOM Bladder	EA	124	TORF2BL	B15/6 Compression Bladder	EA
56	BOMB1BL	15-14.6 BOM Bladder	EA	125	TORF3NBL	RP13/1 Injection Bladder-Reg	EA
57	BOMB3BL	15-17.6 BOM Bladder	EA	126	TORF4BL	RP18/0 Compression Bladder-Reg	EA
58	BOMB6BL	15-20.6 Low gauge Bladder	EA	127	TORK3BL	RP13/6 Injection Bladder-Reg	EA
59	BOMB7BL	15-25.4 BOM Bladder	EA	128	TORK3BLEXL	CONDUCTIVE BLADDER 13 EXR 396/4	EA
60	BOMB9BL	19-19 BOM Bladder	EA	129	TORK6BL	RP15/2 Injection Bladder-Reg	EA
61	BOMC10BL	20-19 BOM Bladder	EA	130	TORK8BL	RP13/7 Injection Bladder-Reg	EA
62	BOMC3BL	20-22.8 BOM Bladder	EA	131	TORK9BL	RP13/8 Injection Bladder-Reg	EA
63	BOMD10BL	28-36.1 BOM Bladder	EA	132	TORL1BL	RP15/5 Injection Bladder-Reg	EA
64	BOMD1BL	24/25-29.2 BOM Bladder	EA	133	TORL5BL	RP15/3 Injection Bladder-Reg	EA
65	BOMD3BL	24/25-36 BOM Bladder	EA	134	TORM3BL	RP18/2 Injection Bladder-Reg	EA
66	BOMD7BL	28-26.7 BOM Bladder	EA	135	TORM4BL	RP18/3 Injection Bladder-Reg	EA
67	BOML2BL	8-24 BOM Bladder	EA	136	X160240	Titanium Dioxide - Rutile (IRM)	KG
68	BOMN7BL	25EXB1200/16 BOM BLADDER	EA	137	X191111	Bladder coat semi-permanent, ML1111	KG
69	BOMN9BL	B265-25-1 BOM BLADDER	EA	138	X194580	Mold release agent DiamondKote W-4580CL	KG

Above items are used as an Indirect Material for manufacturing Bias Tyre, Passenger car Tyre, Two-Wheeler Tyre & Off The Road Tyres. Our study is for Bias Tyre Indirect material cost reduction. Which are the Population for Tyre Industries.

Following 57 items are the details of items which are using for Bias Plant which are considered as a sample of population for study.

List - Items used for Bias Tyre

Sr No	Material	Material Description	UoM	Sr No	Material	Material Description	UoM
1	160118	Ultramarine Violet Colour Pigment	KG	30	BOMC3BL	20-22.8 BOM Bladder	KG
2	160163	Zinc Sterate Precipitated	KG	31	BOMC5BL	20-25.3 BOM Bladder	KG
3	160753	Silicone Emulsion 35%	KG	32	BOMC8BL	20-32 BOM Bladder	KG
4	190165	Water based inside tyre lube- BP-165	KG	33	BOMD10BL	28-36.1 BOM Bladder	KG
5	191228	Anti-tack Agent HL	KG	34	BOMD1BL	24/25-29.2 BOM Bladder	KG
6	193116	Water based inside tyre lubricant ML 311	KG	35	BOMD3BL	24/25-36 BOM Bladder	KG
7	195010O	Rubber Mark Crayon BT 12.5mm sq. Orange	KG	36	BOMD7BL	28-26.7 BOM Bladder	KG
8	195010V	Rubber Mark Crayon BT 12.5mm sq. Violet	KG	37	BOML2BL	8-24 BOM Bladder	KG
9	860120	Orange Colour Dye	EA	38	BOMP9BL	16 EXB 605/9 Exel bladder for 9.00-16	KG
10	890064	DRUM STICK	KG	39	EB44670	EVA bags, pale blue color, 0.06mm x 46cm	KG
11	890065	TACK STICK	KG	40	ID0101	Identification Yarn 300den Cotton White	KG
12	890066B	Tread Marking Paint Blue	KG	41	ID0102	Identification Yarn 300den Cotton Yellow	KG
13	890066E	Orange tread marking paint.	KG	42	ID0103	Identification Yarn 300den Cotton Green	KG
14	890066G	Tread Marking Paint Green	KG	43	ID0104	Identification Yarn 300den Cotton Blue	KG
15	890066P	Tread Marking Paint Pink	KG	44	ID0105	Identification Yarn 300den Cotton Brown	KG
16	890066R	Tread Marking Paint Red	KG	45	ID0106	Identification Yarn 300den Cotton Red	KG
17	890066V	Tread Marking Paint Violet	KG	46	ID0107	Identification Yarn 300den Cotton Pink	KG
18	890066W	Tread Marking Paint White	KG	47	L22127A	295 GSM Yellow Cotton Liners 127cm width	M
19	890066Y	Tread Marking Paint Yellow	KG	48	L23091	Green Cotton Liner UnTreated 91 cm	M
20	890828A	EVA Bags 0.04 x 355 x 450 mm	KG	49	L23160	Green Cotton Liner UnTreated 160 cm	M
21	890829	EVA bags, pale yellow colour, 0.06mm x 3	KG	50	L31140	Rayon-Rayon Multifilament leader liner-1	M
22	930101	Nylon 66 Sewing threads, BS 120N	EA	51	PB04660	PE Ingredient Bags Clear 46x60 cm	KG
23	BOMA4BL	13-13.6 BOM Bladder	KG	52	PB04670	PE Ingredient Bags, 0.05mm x 46cm x 70cm	KG
24	BOMB1BL	15-14.6 BOM Bladder	KG	53	PF2E30	PE Film yellow embossed 0.13MM x 300 MM	KG
25	BOMB3BL	15-17.6 BOM Bladder	KG	54	PF3E36	Green Embossed PE Film, 0.13mm x 360mm	KG
26	BOMB6BL	15-20.6 Low gauge Bladder	KG	55	PF7P260	PE Film 0.075 mm x 260 cm Black	KG
27	BOMB7BL	15-25.4 BOM Bladder	KG	56	X191111	Bladder coat semi-permanent, ML1111	KG
28	BOMB9BL	19-19 BOM Bladder	KG	57	170191	Rubber Solvent	KG
29	BOMC10BL	20-19 BOM Bladder	KG				

Now based on the function & use we are grouping them into family for study and conclusion.

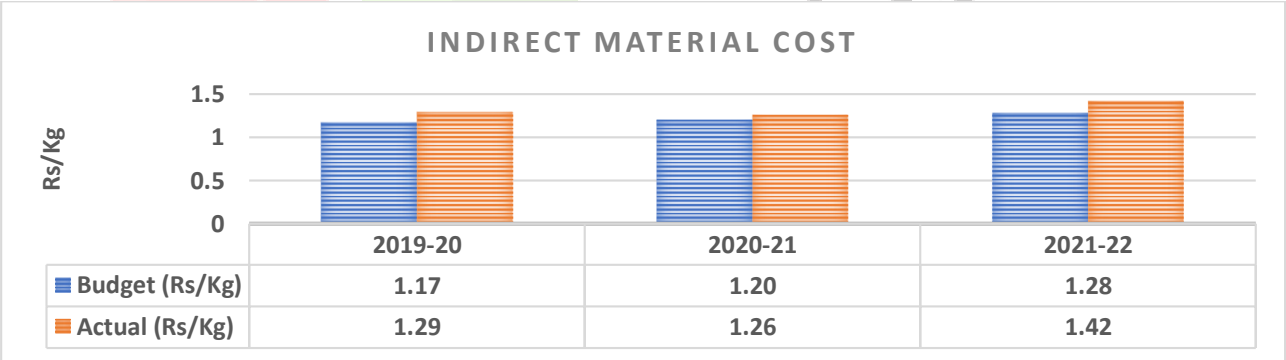
Following are the Group details

Sr No	Material Description	UoM
1	Water Base Inner Lube	KG
2	Rubber Solvent	KG
3	Zinc Sterate Precipitated	KG
4	Silicone Emulsion 35%	KG
5	Anti-tack Agent HL	KG
6	Tread Marking Paint	KG
7	Drum stick	KG
8	EVA Bag	KG
9	Nylon 66 Sewing threads	EA
10	Bladder	KG
11	Identification Yarn	KG
12	Liners	M
13	PE Ingredient Bags	KG
14	PE Film	KG
15	Bladder coat	KG

Data Collection

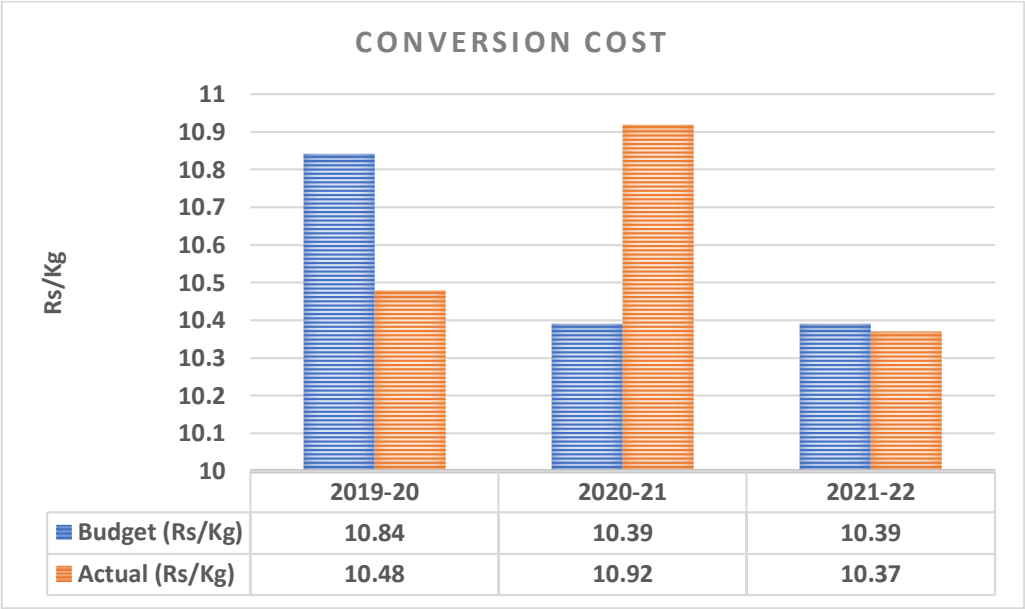
Data Collection done from SAP, Cost trend of Indirect material & Conversion cost from Flash Report, Cost of Indirect material taken from Costing MIS, Study data collected from register, Solvent data from Issue Register, Trial data from Technology Report.

Indirect material Last 3 year Trend (Budget v/s Actual) :



From graph we interpret that Indirect material budget was not achieved

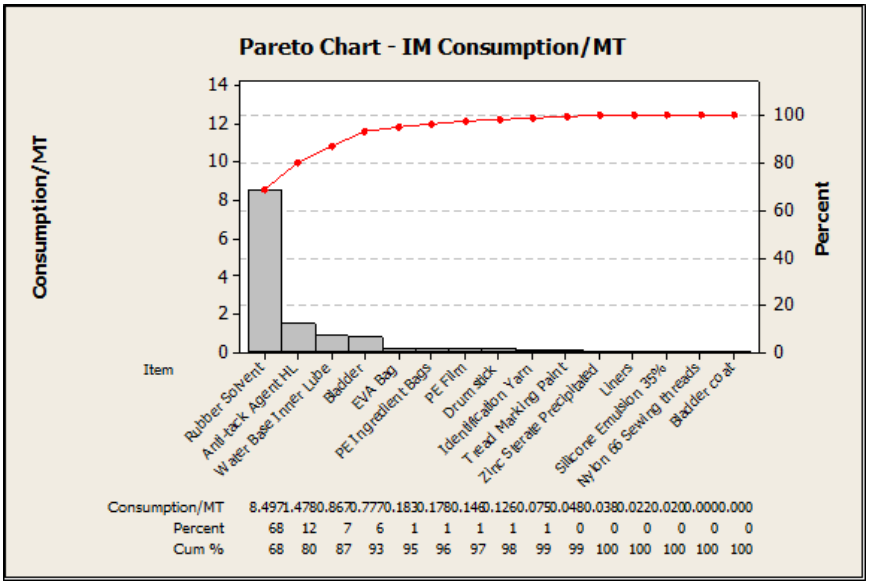
Conversion Cost Last 3 year Trend (Budget v/s Actual) :



As per graph it is clear that indirect material cost has direct impact on conversion cost.

Last 3 Years Indirect material consumption for Bias Tyre (Kg/MT)

Sr No	Material Description	UoM	2019-20	2020-21	2021-22
			Consumption/MT		
1	Rubber Solvent	L/MT	8.713	8.576	8.203
2	Anti-tack Agent HL	KG	1.494	1.479	1.462
3	Water Base Inner Lube	KG	0.877	0.864	0.859
4	Bladder	KG	0.823	0.764	0.743
5	EVA Bag	KG	0.187	0.184	0.178
6	PE Ingredient Bags	KG	0.181	0.178	0.176
7	PE Film	KG	0.147	0.146	0.144
8	Drum stick	KG	0.129	0.126	0.124
9	Identification Yarn	KG	0.077	0.075	0.072
10	Tread Marking Paint	KG	0.051	0.048	0.046
11	Zinc Sterate Precipitated	KG	0.039	0.038	0.038
12	Silicone Emulsion 35%	KG	0.021	0.02	0.020
13	Liners	M	0.026	0.023	0.018
14	Nylon 66 Sewing threads	EA	0.0004	0.0004	0.0004
15	Bladder coat	KG	0.0001	0.0001	0.0001

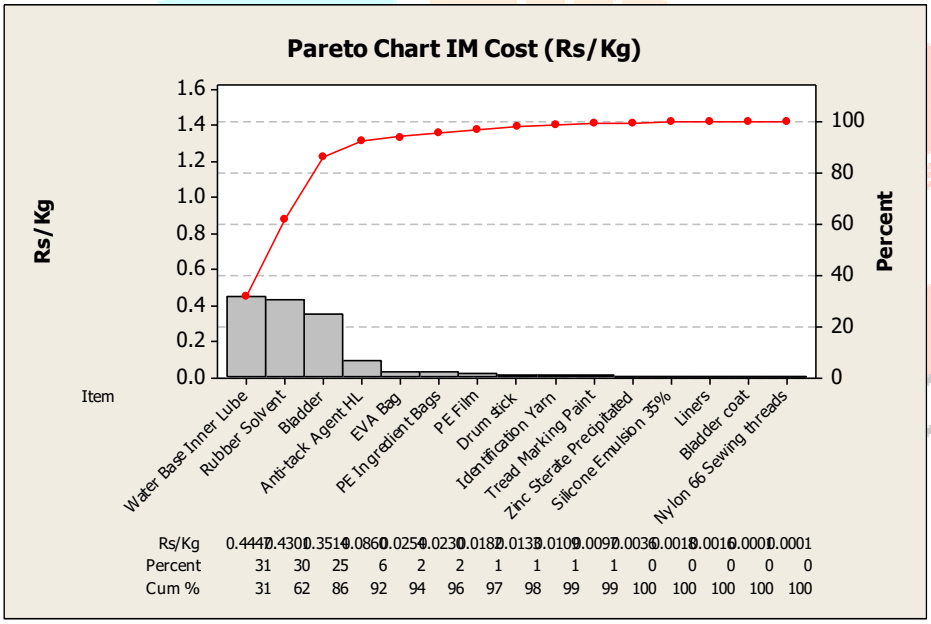


Based on Pareto graph analysis 96.2% contributions due to following Items…

Item	Consumption/MT	%
Rubber Solvent	8.50	68.2
Anti-tack Agent HL	1.48	80.1
Water Base Inner Lube	0.87	87.0
Bladder	0.78	93.3
EVA Bag	0.18	94.7
PE Ingredient Bags	0.18	96.2
PE Film	0.15	97.3
Drum stick	0.13	98.4
Identification Yarn	0.07	99.0
Tread Marking Paint	0.05	99.3
Zinc Sterate Precipitated	0.04	99.7
Silicone Emulsion 35%	0.02	99.8
Liners	0.02	100.0
Nylon 66 Sewing threads	0.00	100.0
Bladder coat	0.00	100.0

If we collect data based on cost and analyse…

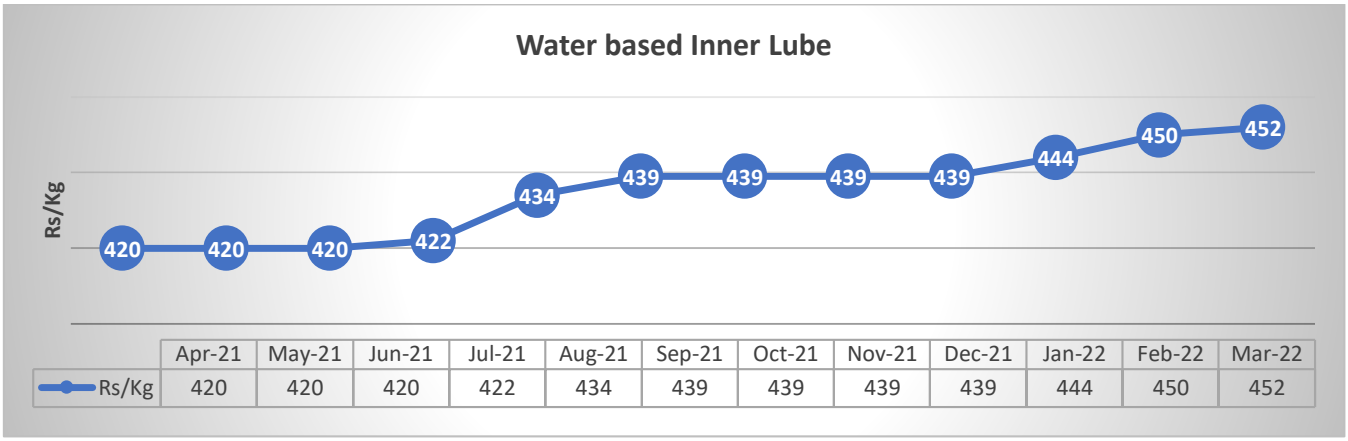
Sr No	Item	Rs/Kg	Cum	%
1	Water Base Inner Lube	0.445	0.445	31.3
2	Rubber Solvent	0.430	0.875	61.6
3	Bladder	0.351	1.226	86.3
4	Anti-tack Agent HL	0.086	1.312	92.4
5	EVA Bag	0.025	1.338	94.2
6	PE Ingredient Bags	0.023	1.361	95.8
7	PE Film	0.018	1.379	97.1
8	Drum stick	0.013	1.392	98.0
9	Identification Yarn	0.011	1.403	98.8
10	Tread Marking Paint	0.010	1.413	99.5
11	Zinc Sterate Precipitated	0.004	1.416	99.7
12	Silicone Emulsion 35%	0.002	1.418	99.9
13	Liners	0.002	1.420	100.0
14	Nylon 66 Sewing threads	0.000	1.420	100.0
15	Bladder coat	0.000	1.420	100.0



Base on Pareto Analysis following are items consumed 94.2% that are the Scope for the study

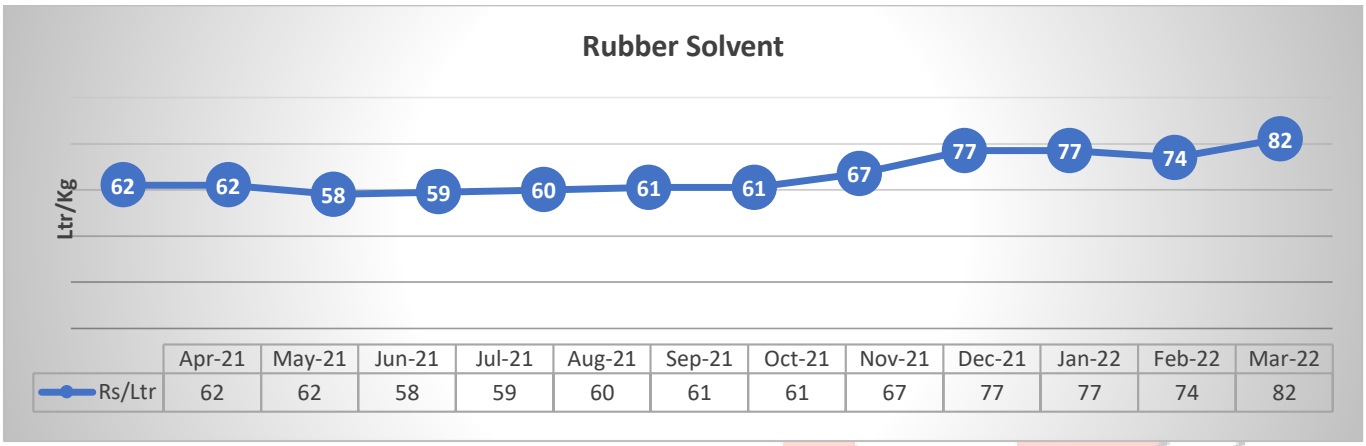
1. Water based Inner lube
2. Rubber Solvent
3. Bladder
4. Antitac Agent
5. EVA Bag

1. **Water Base inner Lube Trend :**



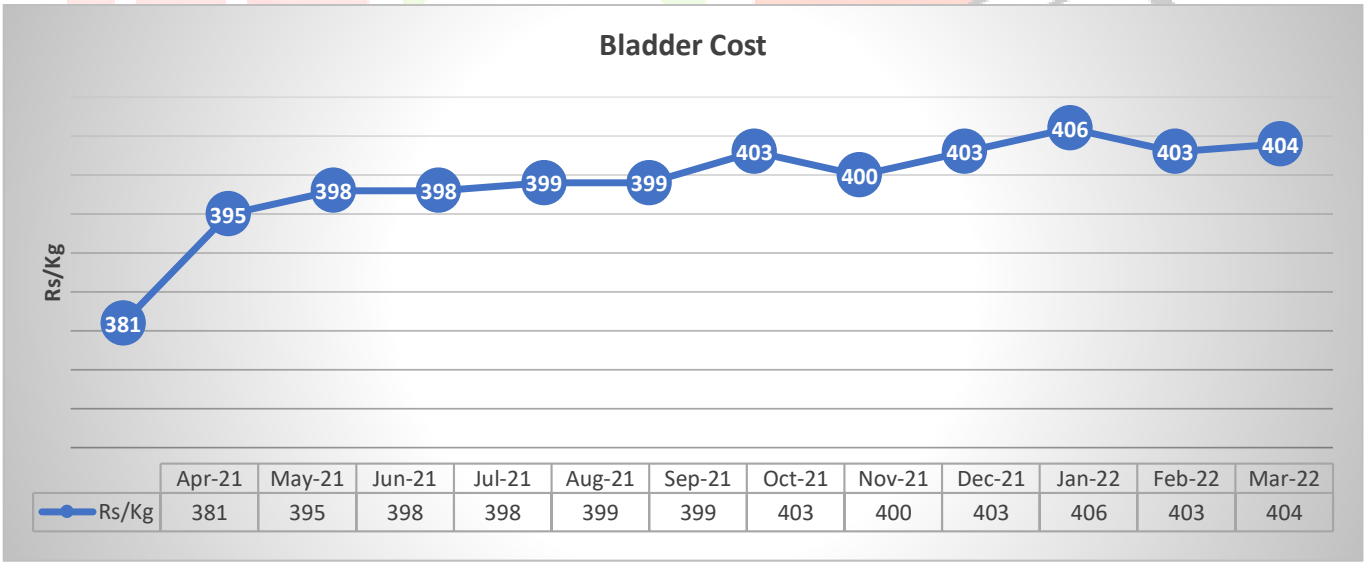
	Apr-21	May-21	Jun-21	Jul-21	Aug-21	Sep-21	Oct-21	Nov-21	Dec-21	Jan-22	Feb-22	Mar-22
Rs/Kg	420	420	420	422	434	439	439	439	439	444	450	452

2. **Rubber solvent Trend :**



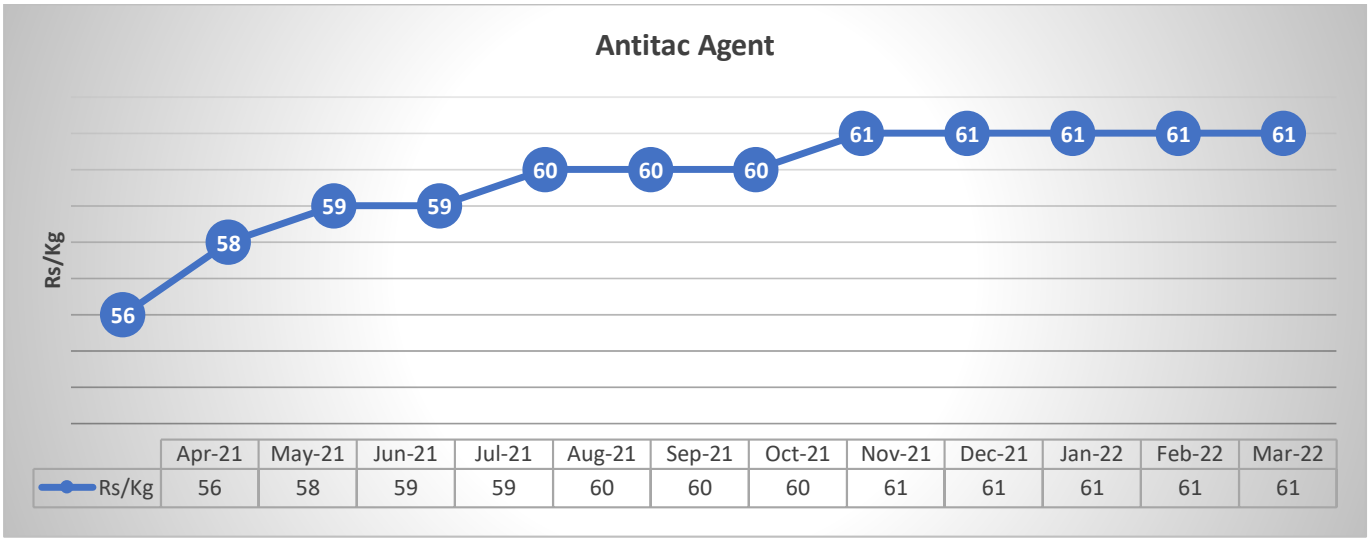
	Apr-21	May-21	Jun-21	Jul-21	Aug-21	Sep-21	Oct-21	Nov-21	Dec-21	Jan-22	Feb-22	Mar-22
Rs/Ltr	62	62	58	59	60	61	61	67	77	77	74	82

3. **Bladder Trend :**



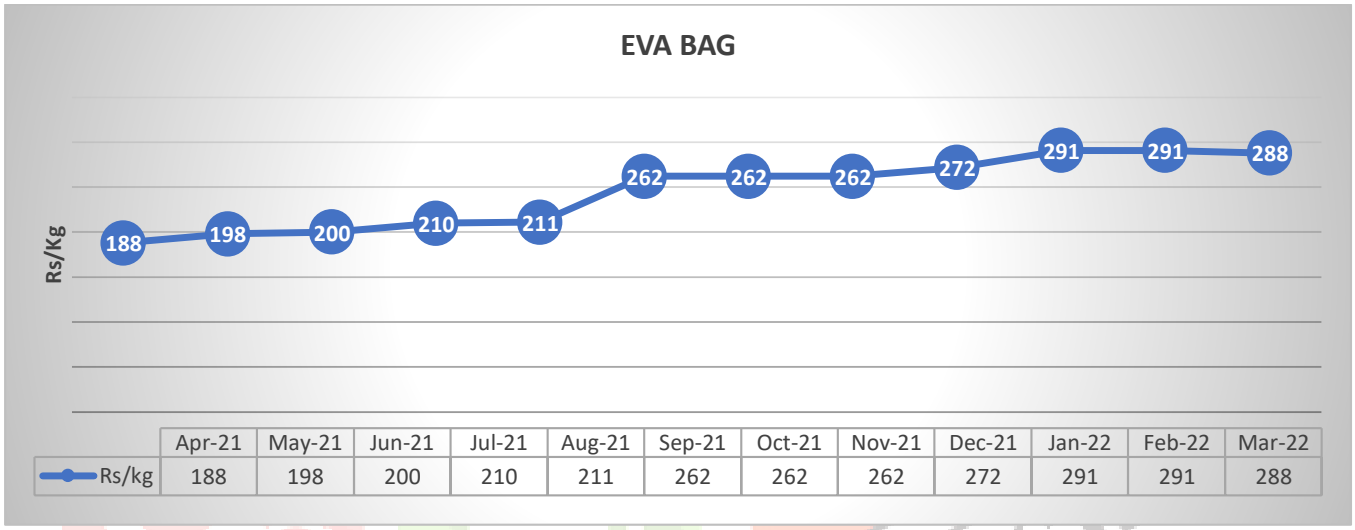
	Apr-21	May-21	Jun-21	Jul-21	Aug-21	Sep-21	Oct-21	Nov-21	Dec-21	Jan-22	Feb-22	Mar-22
Rs/Kg	381	395	398	398	399	399	403	400	403	406	403	404

4. Antitac Agent Trend :



	Apr-21	May-21	Jun-21	Jul-21	Aug-21	Sep-21	Oct-21	Nov-21	Dec-21	Jan-22	Feb-22	Mar-22
Rs/Kg	56	58	59	59	60	60	60	61	61	61	61	61

5. EVA Bag Trend :



	Apr-21	May-21	Jun-21	Jul-21	Aug-21	Sep-21	Oct-21	Nov-21	Dec-21	Jan-22	Feb-22	Mar-22
Rs/kg	188	198	200	210	211	262	262	262	272	291	291	288

Results & Findings :

- Direct Conversion Cost :
  - Indirect cost Budget not achieved from last 3 year
  - 13.5% contribution of Indirect material in Total Direct Conversion cost
- Population & Sample :
  - Total 137 items used as Indirect material in tyre Industry – Population
  - 57 items used for Bias tyre manufacturing – Sample
- Top Contributors in Total Indirect material cost
  - Water base inner lube, Rubber solvent, Bladder, Eva bag and Antitac agent is major contributors – 94% contribution in total cost
  - Indirect material cost increase YoY

- Observations of Top Contributors:
  - Rubber solvent consumption high in Tyre Building area & fly loss is 0.53 ltr/MT & cost increased by 3.25%
  - Inner lube cost contribution is 31.3% & cost increased by 7.62%
  - Anti tack Agent cost increased by 8.92 % & consumption is 12% in total consumption.
  - EVA Bag cost increased by 53.19 % & consumption is 2% in total cost.
  - Tyre Building, Evaporation loss & C261 consumption need to reduced
  - Inner lube consumption as well as cost reduction is main focus
  - Antitac agent consumption reduction in BNB 102/103 need to optimized
  - Bladder consumption reduction is focus area
  - EVA bag size optimization wrt to chemical store in bag

Conclusion

- **Cost Reduction by Solvent Consumption Reduction** :
  - ❖ Tyre Building Solvent :
    - Solvent Consumption during Green Tyre Removal Activity optimization by optimizing squeegee bottle cap length increase & nozzle diameter reduction (QC Project)
    - Gap increase between Drum & Bottom stitcher by reducing bottom stitcher height (QC Project)
    - Reducing drum collapsing diameter
    - Introducing 8 segment drum
  - ❖ C 261 (Outer Lube) :
    - Usage of water base outer lube ipo solvent base – Trial plan, Data Analysis, Bulk Trial pal, Result comparison & Final Implementation (JDI)
  - ❖ Fly Loss :
    - Provision of close container for solvent storage at each Tyre Building machine (JDI)
    - Mapping of Solvent Supply line, Cement house piping & Storage tank for leakages
    - Inventory optimization at issue & user point
  - ❖ Other Controls :
    - Budgetary control – Department wise budget (based on ticket monthly ticket)
    - Standard solvent consumption per Tyre Building to be established & implement in all Tyre Building Machine
    - Alternate material (Food grade hexene) development - Low cost

- **Cost Reduction by Water Base Inner Lube** :

  - ❖ Water base Inner lube consumption reduction :
    - Introducing less diameter nozzle of lube spray gun (QC Project)
    - Lube cycle optimization through synchronization (JDI)
    - Lube spray line & gun cleaning frequency redefine (JDI)

  - ❖ Alternate Source Development :
    - 4 Water lube supplier available, Trial to be planned in control manner, Analyse result, selection of best one based on result, bulk trial, Cost comparison & Final implementation (Technological development)
    - Trial data mapping with relation matrix before selection of new alternative & final implementation

Relation Matrix for Result Comparison :

Source	Specification meet with organization standard	Gun checking frequency	Line jamming frequency	Tyre stuck up with bladder	Defect generation	Bladder life	Lube consumption / Tyre	Cost/ Tyre
Supplier 1	★	●	●	▲	★	★	★	★
Supplier 2	★	●	●	▲	★	★	★	★
Supplier 3	★	●	●	▲	★	★	★	★
Supplier 4	★	●	●	▲	★	★	★	★

Legends : ★ Strong Relation, ● No Relation , ▲ Medium Relation

Source	Specification meet with organization standard	Gun checking frequency	Line jamming frequency	Tyre stuck up with bladder	Crown Buckle	Bladder Mark	Rough bladder	Bladder life	Lube consumption/ Tyre	Cost/ Tyre
Supplier 1	√	X	X	X	X	X	X	↑	↓	↓
Supplier 2	√	X	X	X	X	X	X	↑	↓	↓
Supplier 3	√	X	X	X	X	X	X	↑	↓	↓
Supplier 4	√	X	X	X	X	X	X	↑	↓	↓

Legends : √ - Must, X – Not increase, ↑ - Increase, ↓ - Decrease

- **Cost Reduction by Bladder consumption Reduction** :

  - ❖ Strengthening of Daily Work Management Activities (DWM) :
    - Inventory Optimization
    - Advance mould/change bladder change planning
    - Issue system – Based on inventory & expected consumption.
    - Tagging system for assembled bladder – Monitoring.
    - Bladder classification – Review Mechanism
    - System to be developed for Reuse of old bladders.
    - Bladder Item Inspection & disposition
    - Revisit bladder life wrt performance
    - Lubing Quality monitoring

- ❖ Preventive Measures :
  - Identification & correction of degradation affected TCPs (PM)
  - Arms roller, height & width measure & correction plan (Check list)
  - Warm up cut circuit optimization (JDI)
  - Provision of LVDT in 36" TCPs
  - Single piece bladder development (JDI)
  - PAJ preventive maintenance activities

- ❖ Bladder development :
  - 9.00-16 size Assembly leak issue – Bladder heal design modifications
  - 15.14-6 size bladder gauge optimization

- ❖ Data retrieval :
  - Online data entry & report generation
  - Warm up cut – Vacuum circuit optimization

- **Cost Reduction by Antitac agent consumption Reduction** :
  - Mapping for leakages :
    - Storage tank condition – Replace MS with SS (BNB 103/104)
    - Pipe module leakages identification & correction (JDI)
    - Issue system – Based production schedule
- **Cost Reduction EVA bag consumption Reduction** :
  - Mapping of Compound wise Chemical weight based on recipe :
    - Optimization of EVA bag size based on minimum & maximum chemical usage in Master & Final Compound (JDI)
    - Issue system – Based production schedule
    - Storage under executive control

Reference of literature Review, Study and Data Collection

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